Northern North Atlantic temperature and pH reconstructions through the Common Era, using the coralline algae *Clathromorphum compactum*

E. ANAGNOSTOU[1]*, B. WILLIAMS[2], P. MOFFA-SANCHEZ[3], W.H. ADEY[4], G.L. FOSTER[5], AND J. RIES[6]

[1] GEOMAR Helmholtz Centre for Ocean Research Kiel, Wischhofstr. 1-3, 24148 Kiel, Germany (*correspondence: eanagnostou@geomar.de)

[2] Claremont McKenna-Pitzer-Scripps College, 925 N. Mills Ave, Claremont, CA 91711, USA (bwilliams@kecksci.claremont.edu)

[3]Cardiff University, Cardiff CF10 3AT, UK (moffasanchezp1@cardiff.ac.uk)

[4]National Museum of Natural History, Smithsonian, Washington, DC 20013, USA (adeyw@si.edu)

[5]Ocean and Earth Science, University of Southampton, SO14 3ZH, UK (gavin.foster@noc.soton.ac.uk)

[6]Marine Science Center, Northeastern University, 430 Nahant Rd, Nahant, MA 01908, USA (j.ries@northeastern.edu)

The Arctic and Subarctic coralline algal *Clathromorphum compactum* growth has been linked to sea ice extent and nutrient supply. In this study, we apply two newly developed proxies linking the boron isotopic composition of the algal high-magnesium calcite skeleton to seawater pH and its Mg/Li ratio to seawater temperature. These proxies are applied to algal colonies collected from the Canadian Arctic and the Labrador Coast. At both locations boron isotopes and Mg/Li ratios document significant changes in pH and temperature over the last ~ 600 years. In the earlier part of the record, within the Medieval Warm Period and the Little Ice Age, these changes are linked to sea ice expansion and retreat. Post 1850 CE, the proxy data suggest a progressive ocean acidification and warming signal. This trend is interrupted by further sea ice contraction and increase in Greenland meltwater and nutrient delivery, that enhanced algal growth in the region, resulting in increasing seawater pH. During the same time, the algal Mg/Li ratios indicate cooler temperatures in the Labrador region, potentially linked to the coeval Atlantic Meridional Overturning Circulation decline post ~1950. This study not only demonstrates the potential of high resolution boron isotope and Mg/Li proxies within coralline algae, but also highlights the complexity of temperature and carbon cycling within the northern north latitudes throughout the common era.